

## OUTLINE SHEET 2-3-1

### Self-Contained Breathing Apparatus

#### A. Introduction

Smoke inhalation is the leading cause of personnel casualty in shipboard fires. Various self-contained breathing apparatus are essential tools in minimizing, if not eliminating, casualties. This lesson serves as a refresher of the lessons learned in your previous command.

#### B. Enabling Objectives

- 2.6 **STATE** the purpose of the Emergency Escape Breathing Device and the Supplemental Emergency Egress Device.
- 2.7 **DESCRIBE** the operating characteristics of the Emergency Escape Breathing Device and the Supplemental Emergency Egress Device.
- 2.8 **DESCRIBE** the procedure for donning the Emergency Escape Breathing Device.
- 2.9 **DESCRIBE** the procedure for operating the Supplemental Emergency Egress Device in a simulated engineering environment.
- 2.10 **DESCRIBE** the procedure for donning an Oxygen Breathing Apparatus.
- 2.11 **DESCRIBE** the operating characteristics of an Oxygen Breathing Apparatus.

#### C. Topic Outline

- 1. Introduction
- 2. Overview
- 3. Supplementary Emergency Egress Device
- 4. Emergency Escape Breathing Device
- 5. Oxygen Breathing Apparatus
- 6. Summary and Review
- 7. Assignment

**ASSIGNMENT SHEET 2-3-2**  
Self-Contained Breathing Apparatus

A. Introduction

This material is to be completed prior to the material being covered in class.

B. Enabling Objectives

Refer to enabling objectives in Outline Sheet 2-3-1.

C. Study Assignment

1. Read Information Sheet 2-3-3

D. Study Questions

1. What is the purpose of SEED?
2. How long will a SEED last?
3. What is the only purpose of EEBD?
4. What are the hazards involved in the use of EEBD?
5. What are the hazards involved in the use of OBA?

## INFORMATION SHEET 2-3-3

### Self-Contained Breathing Apparatus

#### A. Introduction

This information describes the purpose, parts and operation of the SEED, EEBD, and OBA.

#### B. Reference

NSTM 555  
NSTM 077  
SEED 4140-01-378-2096  
DC 3&2 NAVEDTRA 10572

#### C. Information

- I. The Supplementary Emergency Egress Device (SEED) is a small air canister worn by every watchstander in the main machinery spaces. It has a holster that can be attached to the belt.
  - A. It is used whenever life threatening conditions occur that inhibit the watchstander's ability to locate and don an Emergency Escape Breathing Device (EEBD).
  - B. Because the SEED lacks protection for the eyes and nose and has a short operational time, it is intended only as a supplemental device.
  - C. It provides the watchstander with 1.5 to 3 minutes worth of air.
- II. SEED components :
  - A. Mouth piece
  - B. Mouth piece covering seal, attached to the holster by a lanyard
  - C. Cylinder
  - D. Pressure indicator
  - E. Charging fitting
  - F. Check valve cap
  - G. Regulator - built into the mouthpiece; used to control the flow of air.
  - H. Exhaust valve located at underside of the regulator
  - I. Holster
- III. Each oncoming watchstander is required to inspect the SEED as follows:
  - A. Inspect cylinder markings. The date stamped on the cylinder neck is the date of the last hydrostatic test. Remove from service if five years have elapsed from the last date stamped on the cylinder neck.
  - B. Inspect regulator and cylinder for external damage, dents cracks, and corrosion. Replace unit if damaged.
  - C. Inspect regulator for signs of dirt or salt contamination. If contamination is evident, remove from service until cleaned.

- D. Inspect exhaust valves on the underside of the regulator for tears or damage.
- E. If the indicator pointer on the pressure indicator is in the lower edge of the green zone and the ambient temperature is above 70 degrees Fahrenheit, remove unit from service.
- F. Inspect for a full charge. Pressure indicator pointer should be within the green zone (at or above 2600 psi).
- G. Inspect regulator for missing check valve cap. Replace cap if missing.
- H. Inspect device for torn or missing mouthpiece cover. If cover is torn or missing, replace and remove unit from service for cleaning.
- I. Inspect holster for torn or missing parts. Replace if necessary.
- IV. Operational Procedures of the SEED:
  - A. Unfasten holster: remove SEED from holster with a forward motion, grasping the underside of the regulator housing.
  - B. Place mouthpiece in mouth.
  - C. Breathe using slow, controlled breaths.
  - D. Egress hazardous area immediately or locate and don EEBD.
- V. Post-Operational Procedures.
  - A. Check the pressure indicator for operational charge. The dial gauge pressure indicator should read in the green zone.
  - B. Inspect for external damage.
  - C. Inspect mouthpiece for cleanliness and security.
  - D. Inspect regulator for signs of contamination and cleanliness.
  - E. Replace SEED in stowage cabinet.
  - F. If any discrepancies are found, tag and enter in department tag-out log; return SEED to servicing branch.
- VI. The Emergency Escape Breathing Device (EEBD) is a self- contained, hooded emergency breathing device used to escape from compartments contaminated by smoke, refrigerants, or other toxic gases.
  - A. The EEBD is packaged in a vacuum sealed plastic bag and then placed in an orange, plastic stowage case.
  - B. The EEBD consists of a hood and life support pack.
  - C. The life support pack consists of an oxygen generator and a scrubber element for removing CO<sub>2</sub> and water vapor.
  - D. The system maintains a positive pressure inside the hood to prevent smoke and toxic gases from entering.
  - E. The EEBD will operate for 15 minutes after it is activated.
  - F. EEBD is used when the atmosphere becomes life threatening or when space evacuation is ordered by the watch supervisor.
- VII. EEBD donning procedure:
  - A. Remove EEBD from case.
  - B. Locate the non-skid notches at each end of the bag and pull tear-strip off.
  - C. Remove EEBD from the bag.
  - D. Pull actuating ring.

- E. A hissing sound will be heard indicating that the EEBD has been activated.
  - F. Spread the neck seal apart.
  - G. Lean forward and put the EEBD up to your face and place chin in the opening of the neck seal. Pull the hood up and over your head.
  - H. Stand straight up and pull hood down until the head straps fit snug around your head. Be sure the neck seal is in contact with your neck, and there is no clothing or hair between the neck and the neck seal.
  - I. Stay away from all sources of ignition after use of the EEBD. Oxygen is trapped in the hair and must be given time to dissipate.
  - J. Never use an EEBD for firefighting, entering voids, or other applications that it is not intended for.
- VIII. The Oxygen Breathing Apparatus (OBA) is a self contained device that generates oxygen and allows the wearer to breathe independently of the surrounding atmosphere.
- A. When in operation, the air within the apparatus is continuously replenished with oxygen while exhaled carbon dioxide (CO<sub>2</sub>) and water vapor are removed by the chemicals in the canister.
  - B. There is an optional spectacle kit that allows use of eye glasses in the facepiece.
- IX. OBA components:
- A. Facepiece - contains the eyepiece, the speaking diaphragm, combination valve assembly, and the head straps. The eyepiece is a one-piece clear lens.
  - B. Combination valve assembly - located immediately below the speaking diaphragm which contains the inhalation and exhalation flapper check valves. The inhalation tube is attached to one end, and the exhalation tube is attached to the other end of the combination valve assembly.
  - C. Breathing tubes - one transports oxygen from the breathing bag to the facepiece, the other transports the exhaled air back to the canister. Both tubes are made of corrugated rubber. The tube fittings are quick-disconnect type.
  - D. Breathing tube couplings - color coded and the supply tube is of a different size than the exhaust tube. This eliminates the possibility of connecting the tubes to the wrong couplings.
  - E. Body harness and pad - goes over the shoulders and snap into "D" rings. This supports the weight of the OBA.
  - F. Breathing bag - holds the oxygen generated by the canister.
  - G. Breastplate - houses the plunger assembly, canister guard, holder, and the bail assembly handle.
  - H. Plunger - pierces the copper foil seal of the canister when the canister is seated in place.
  - I. Bail assembly handle - actuates the seating mechanism that positions the canister in the housing.

- J. Waist strap - prevents the OBA from swinging side to side.
- K. Canister release strap
- L. Pressure release valve and pull tab - automatically releases excess oxygen from the bags or can be done manually with the pull tab.
- M. Timer - set by the wearer to warn the operator that the canister needs to be replaced. It will ring for 8-10 seconds when it reaches zero.
- X. The OBA quick start canister is green and concave on one side. It has ribs to properly position the canister in the canister guard.
  - A. The top of the canister is protected by a removable aluminum cap. Ensure the copper foil seal and rubber gasket are exposed when the aluminum cap is removed.
  - B. On the bottom of the canister is the removable candle cover with a rotating swivel plate.
  - C. The candle cover rests on the candle and is attached to the candle by a lanyard and cotter pin.
  - D. When the candle cover is removed, it will dangle by the lanyard until pulled by the operator.
  - E. Removing the cotter pin fires the candle and the canister starts generating oxygen.
- XI. Red canisters are only used for training.
- XII. The flow of air within the Type A-4 OBA is as follows:
  - A. Exhaled air flows down from the facepiece through the exhalation valve and tube down to the canister.
  - B. The exhaled air then rises through the chemicals in the canister. CO<sub>2</sub> and moisture from the breath react with the chemicals generating oxygen.
  - C. The air from the canister flows into the breathing bags and then through the inhalation tube and valve and up to the facepiece.
- XIII. Donning and adjusting Type A-4 OBA
  - A. Check that the bail assembly handle is down and locked.
  - B. Attach facepiece breathing tube quick-disconnect couplings (if not attached) to the apparatus as follows:
    - 1. Couplings are different sizes and color to ensure proper assembly.
    - 2. Fully retract spring loaded outer sleeve of coupling.
    - 3. Push couplings firmly over nipples (black onto black and blue onto blue).
    - 4. Release spring loaded outer sleeve.
    - 5. Test connection. Grasp hose at clamp and pull lightly. If installed correctly, coupling will not pull off.
  - C. Fully extend and straighten all body harnesses and waist straps.
  - D. Extend facepiece head straps and place harness strap assembly in front of the facepiece lens.
  - E. With one hand grasp facepiece by the combination valve assembly and the apparatus by the bail handle.

- F. With the other hand, grasp the body straps of the body harness and pad.
- G. Bring pad and harness over the head and position OBA on chest.
- H. Run the under arm straps under the arms and attach snap hooks to the D-rings on the top corners of the breastplate assembly.
- I. Position breastplate so the breathing tube quick-disconnect couplings are slightly below the shoulders.
- J. While apparatus is held in position, adjust the under arm straps and then the shoulder straps until apparatus fits comfortably.
- K. When adjusted correctly, the harness pad is located in the top center of the back, and head movement is not restricted when the facepiece is donned.
- L. Place the facepiece over and behind the head so it is out of the way.
- M. Use of the waist strap is optional. If used, snap the waist strap to the brackets on lower side corners of the breastplate.
- N. Adjust this strap to hold apparatus snugly to the body. Wrap excess strap under the secured part of the strap.
- XIV. Install canister in accordance with the following procedure:
  - A. Remove canister tear-off cap. This exposes the copper foil seal and O-ring. Inspect copper foil seal and O-ring to ensure both are intact.
  - B. Remove candle cover. Hold canister upside down and rotate swivel plate 180 degrees. Pull swivel plate up and toward center of canister. Leave cover dangling from lanyard. Do NOT pull lanyard until canister is in place and ready to be activated.
  - C. With the bail handle locked in the down position, insert the canister upward into the guard.
  - D. The canister is correctly inserted when it is firmly held by the retaining mechanism. The OBA is now in the standby position.
- XV. Don the facepiece as indicated in the following:
  - A. Insert chin into the facepiece chin stop.
  - B. Pull head harness strap assembly from front of face piece over the head.
  - C. Tighten both neck straps at the same time, then tighten side straps next. Do not tighten forehead strap at this time.
  - D. Place both hands on head harness pad (on back of head) and push it down toward neck.
  - E. Retighten first the neck and then the side straps.
  - F. Tighten forehead strap.
  - G. When properly donned, both neck and side straps are tightened equally, the facepiece is centered on the face, and the head harness pad is centered squarely on the back of the head.
- XVI. Test facepiece sealing:
  - A. Squeeze the corrugated breathing tubes together tightly with one hand. Inhale gently.
  - B. The facepiece should collapse inward while breath is held. This

- indicates a gas tight seal.
  - C. Hold breath for 5 seconds. If leakage is detected, readjust head harness straps. Test the facepiece seal each time facepiece is donned.
  - D. Make final adjustments to all four body harness straps to ensure that the facepiece will not shift when the head is moved up and down, and the breathing tubes will not catch on the timer.
- XVII. Placing the OBA in standby condition
  - A. Loosen neck facepiece straps only
  - B. Remove facepiece and place it over and behind the head, out of the way until needed.
- XVIII. Placing oxygen breathing apparatus in operation:
  - A. If in a standby condition, don facepiece and retighten the neck straps. Retest facepiece seal.
  - B. Using both hands, depress tabs on bail handle to unlock bail assembly from the standby (down) position. Swing handle upward until it snaps into position. The handle should not move.
  - C. Pull canister lanyard out, away from the body. Hold lanyard up and visually inspect it to ensure that the cotter pin has been removed. If the cotter pin is attached to the lanyard, the canister has been fired.
  - D. Should the lanyard break, the canister can be started by pulling out the cotter pin with a pair of pliers. Assistance should be obtained to remove the cotter pin in this manner.
  - E. While the candle is filling the breathing bags, depress the left breathing bag at the pressure release pull tab with the left hand.
  - F. Simultaneously grasp and seal off both breathing tubes with the right hand while pressing against the right breathing bag with the right elbow.
  - G. Compress the left bag at the pressure release tab so the relief valve does not lift during this test.
  - H. This procedure tests the canister, tube connectors, and breathing bags for tightness. If the bags do not remain inflated during the test, determine the cause of the leak and correct before use.
  - I. Set the timer. Rotate the timer knob clockwise to 60 minutes, then set the timer for 30 minutes. Rotating the timer knob to 60 minutes before setting the timer to 30 minutes is required to completely wind the timer bell.
  - J. When the timer is set for 30 minutes, the pointed end of the timer knob will be pointing directly toward the wearer. The pointed end of the timer knob will be pointed directly away from the wearer when the bell sounds.
- XIX. Canister Manual Starting:
  - A. Grasp the combination valve assembly with both hands and pull

- facepiece away from face enough to break the mask's seal.
- B. Inhale deeply from external atmosphere. Relax grip to allow facepiece to reseal on face.
- C. Exhale forcefully into facepiece.
- D. Repeat steps until breathing bags are full and cool oxygen is felt on face after exhaling. Three or four times should be sufficient.
- E. Carefully feel the bottom of the canister without gloves. If it is warm, oxygen is being generated and the apparatus is ready for use. If canister is not warm, repeat steps.
- F. Recheck seal on facepiece, set timer, and proceed with work.
- XX. When a tending line is employed, the OBA wearer shall remain in constant contact with the line tender. This is accomplished by the tending line signal system. The codes for the signals spell OATH.
  - A. = OK
  - B. = Advance
  - C. = Take up slack
  - D. or more = Help
- XXI. Canister removal:
  - A. Depress tabs on the bail handle. Push bail handle down from operating position to standby position.
  - B. Loosen or disconnect the waist strap to allow OBA to swing away from body.
  - C. Spread legs apart, lean upper body forward, and pull canister release tab. The canister should drop out of OBA.
  - D. If canister fails to fall out, shake the OBA. This should free the canister.
  - E. Do not touch canister during removal. Expended canisters are hot and will burn unprotected skin.
  - F. Never allow foreign material, particularly grease, oil or water to enter neck of canister. Any of these substances can cause a violent chemical reaction and may even cause the canister to explode.
  - G. Replace the used canister with a new canister.
  - H. Perform the leak test step each time a fresh canister is inserted and started. If the facepiece is removed, leak test the facepiece after putting it back on.
- XXII. Removing oxygen breathing apparatus:
  - A. Place the facepiece over and behind your head in the standby position and remove the canister.
  - B. Loosen then unhook waist strap.
  - C. Loosen shoulder straps and unhook underarm straps from the upper corners of breastplate assembly.
  - D. Move facepiece to the vicinity of the bail handle and grasp facepiece and bail handle with one hand.
  - E. Grasp shoulder harness with other hand, preferably at D-ring connector and lift harness over head.

- F. If wet or moist, wipe down OBA.
- G. Always clean OBA and disinfect facepiece after each use in accordance with PMS requirements.